Responsibility for the regulation of health and safety on the railways was transferred from the Health and Safety Commission (HSC) and Health and Safety Executive (HSE) to the Office of Rail Regulation (ORR) on 1 April 2006.

This document was originally produced by HSC/E but responsibility for the subject/work area in the document has now moved to ORR.

If you would like any further information, please contact the ORR's Correspondence Section - contact.cct@orr.gsi.gov.uk

HSE
Health & Safety Executive
HM Railway Inspectorate

RAILWAY SAFETY PRINCIPLES and GUIDANCE

part 2
section B

Guidance on stations

HSE BOOKS

CONTENTS

FOREWORD

This document is one of eight which provide guidance on specific aspects of railway construction. It continues the tradition of providing written advice started by the Railway Inspectorate soon after its formation in 1840.

This latest version of the guidance under its new title *Railway safety principles and guidance* revises and updates the previous advice contained in the *Railway construction and operation requirements for passenger lines and recommendations for goods lines* documents which became known throughout the industry as 'The Blue Book' or simply the 'Requirements'.

The guidance is now being published in two distinct 'Parts'. Part 1 sets out the top level safety principles and gives an indication of the factors which need to be taken into account in implementing them.

Part 2 consists of eight separate sections dealing with specific aspects of railway construction. It provides an expansion of the advice given in Part 1 and also gives examples of good practice acceptable to the Inspectorate, for those who would find such advice of assistance.

The eight sections in Part 2 deal with specific aspects of railway construction:

A The infrastructure;
B Stations;
C Electric traction systems;
D Signalling;
E Level crossings;
F Trains;
G Tramways;
H Minor railways.

The RSPG series Parts 1 and 2 can be found on the HSE website at: http://www.hse.gov.uk/railways/information.htm under Railway safety principles and guidance.

As with previous guidance, these documents are intended to give advice and not set an absolute standard.

During the development of the new format and preparation of the principles and guidance, the Railway Inspectorate has consulted extensively with the railway industry and other organisations who could usefully contribute to the work. Much assistance and many constructive comments have been received and the Inspectorate is most grateful for the time and help it has been given.

It is hoped that the railway industry of today will find this new guidance to be of as much help as the Blue Book's advice was in the past.

1 INTRODUCTION

1 *Railway safety principles and guidance* is intended to give guidance and advice to those involved in the design and construction of new and altered works, plant and equipment (which includes trains and other rail mounted vehicles) capable of affecting the safety of railways, tramways or other guided transport systems, which require approval under the Railways and Other Transport Systems (Approval of Works, Plant and Equipment) Regulations 1994.

2 This document is not intended to set out mandatory standards. It supports and amplifies the Part 1 station safety principles by giving examples of established good practice acceptable to the Inspectorate, for those who would find such advice of assistance. The full text of these principles can be found in Appendix A - Station principles.

3 Specific guidance on stations and tramstops for tramways is contained in Part 2, Section G *Tramways* which deals specifically with tramways.

Application of the guidance

4 Application of this guidance should provide a sufficient level of safety for approval to be given by the Inspectorate, provided that it has been demonstrated that the use of the guidance is wholly applicable to the works, plant or equipment.

5 If this is not the case, then the Inspectorate will wish to be satisfied that due consideration has been given to implementing the safety principles in the Part 1 document *Railway safety principles and guidance* in a way that ensures that all intolerable risks have been eliminated and that all remaining risks have been reduced to be as low as reasonably practicable (known as ALARP).

Effects on existing works

6 *Railway safety principles and guidance* does not apply retrospectively to existing works, plant and equipment. However, new or altered works, plant and equipment might introduce incompatibilities or inconsistencies with the existing works, plant or equipment. In this case, approval may only be given if appropriate arrangements have been made to address these safety implications which may include modifications to the existing works, plant or equipment.

Operating conditions

7 The choice and design of the works, plant and equipment will depend not only on the guidance expressed in this document but also on the operational requirements of the railway.

8 In assessing the suitability of any proposed safety measures or arrangements, it is important to take into account:

(a) normal operating conditions;

(b) degraded conditions where any component or part of the railway system has failed;

(c) foreseeable abnormal conditions to which the system may be subjected; and

(d) emergency situations.

Design and building

9 The guidance applies to the finished works, plant or equipment but not to the processes of designing or building. Designers and builders need to be aware of the responsibilities imposed upon them by the Construction (Design and Management) Regulations 1994 made under the Health and Safety at Work etc Act 1974.

Approval procedures

10 Guidance on the procedures to be adopted, and the format of the documents to be submitted by those seeking approval of projects, is contained in the HSE publication *Guide to the approval of railway works, plant and equipment* (second edition), is published on the HSE website at: http://www.hse.gov.uk/railways/approval/approval.pdf.

11 The normal maintenance and repair of existing stations do not require approval. The Guide also gives details of those works, plant and equipment not requiring approval.

Other regulations and standards

12 Works, plant or equipment may be subject to other specific regulations, for example, the Electricity at Work Regulations 1989. In implementing the guidance in this document, compliance with these regulations must be considered and specific reference is made to the more significant regulations.

13 Similarly, any material or article used in the provision of works, plant or equipment may need to comply with a specific standard. The guidance in this document does not make reference to these numerous standards, however, an indication is provided where standards may be appropriate.

Note: Any reference in this guidance to any material or article complying with a specific standard should be satisfied by compliance with any relevant standard recognised in any member state of the European Communities, providing that the standard in question offers guarantees of safety, suitability and fitness for purpose equivalent to those offered by the standard referred to in this guidance.

Fire precautions

14 Certain matters covered in this document fall within the provisions of the Fire Precautions Act 1971 and the Fire Precautions (Sub-Surface Railway Stations) Regulations 1989. Changes to existing stations and new station design should be reviewed with the Fire Authority having jurisdiction to determine the exact requirements of relevant legislation.

15 Normally, major surface stations will require certification under the Fire Precautions Act. Minor stations may be exempt from the need to have a Fire Certificate by virtue of section 9 or section 5 of the Act. Sub-surface stations will be required to meet specific regulations made under section 12 of the Act. Particular concerns may arise where sub-surface stations are linked to surface stations and where new premises are established within, alongside or above existing stations.

16 This document includes specific references to sub-surface stations and identifies requirements imposed by these regulations. The local Fire Authority should be consulted regarding the applicability of specific fire legislation.

17 Railways which run mainly on the surface may have sub-surface stations and railways which run underground may have surface stations. In such cases the appropriate paragraphs should be applied. Where a surface station is directly linked to a sub-surface station, the more stringent requirements of the latter may prevail at both stations.

Structure of the guidance

18 The guidance is structured, as far as is practicable, in a logical sequence which follows the main elements of the station. This structure best assists those responsible for the design of works, plant or equipment.

19 A 'Note' is used to provide additional information relevant to the paragraph(s) of guidance which precede it.

Terminology

20 Throughout the document, verbs with specific meanings are used:

(a) **should** - the primary verb for statements of guidance;

(b) **may** - where the guidance suggests options;

(c) **must** - only used where there is a legal/statutory requirement for the measures described to be employed. Reference to the Act or Regulations will be provided;

(d) **is (are) required** - having decided upon a particular option or arrangements, some consequential choices stem from that first decision. This expression is used to indicate those consequential choices and where firmer guidance is considered appropriate.

21 Where possible the document has been written in plain English. However, some words or expressions are used in a way which has a slightly wider meaning than their natural meaning. These words are given in Appendix B - Common terms.

2 STATION PLATFORMS

22 This chapter describes measures that are applicable to all station platforms. Additional guidance applicable to sub-surface (including underground) platforms is given in Chapter 9 - Additional guidance for sub-surface (including underground) railway stations.

Note: The guidance given in Chapter 9 may also apply to new major surface stations and to existing surface stations where they are altered by building over or otherwise covering over a significant part of the platform(s).

Platform layout

23 Factors to consider about platform layout:

(a) No platforms should be built adjacent to lines where the line speed exceeds 200 km/h.

(b) Stations should be constructed with straight platforms and on the level or on a gradient not steeper than 1 in 500. Minor stations, at which trains do not terminate or reverse, may be built on steeper gradients where suitable arrangements can be made to ensure safety, subject to the agreement of the Inspectorate.

(c) The location of station buildings and platform canopies should take account of the need for the sighting of signals.

Platform construction

24 Factors to consider about platform construction:

(a) Platforms should be long enough to accommodate the longest train booked to call at the station plus an allowance for inaccurate stopping, normally 2 m (5 m at main-line stations and termini). Exceptionally, at existing stations, a shorter platform may be accepted provided that it is long enough to accommodate the majority of trains and special arrangements are agreed with the Inspectorate for other trains.

Note: Where special situations exist, such as Automatic Train Operation or platform screen doors, the necessary stopping allowance and platform length should be agreed with the Inspectorate.

(b) The width of any platform should be adequate for the greatest number of passengers likely to use it at any time. Platform buildings or other obstructions should not cause undue restrictions to the movement of passengers. It may be necessary to allow extra width if the platform is to be used by passengers as a route between one part of the station and another (but see restriction in paragraph 71). At busy stations, barriers may be required to prevent platforms becoming overcrowded.

(c) Where it is not reasonably practicable to maintain a constant width of platform throughout its length, it may be reduced in width at its ends. The full width should be provided over the centre third of the platform length, or longer as necessary to include any main access.

(d) Single-face platforms should not be less than 2500 mm wide. Where trains pass a platform at speeds greater than 165 km/h, this minimum width should be increased to 3000 mm.

(e) Island platforms should not be not less than 4000 mm wide. Where trains pass an island platform at speeds greater than 165 km/h, this minimum width should be increased to 6000 mm.

(f) All columns or other obstructions should be at least 2000 mm clear of the platform edge.

(g) Platforms should have a clear headroom of at least 2500 mm to structures and platform signs for a width of at least 2000 mm from the platform edge over their whole length. This dimension may need to be increased where the floor level of any trains is high relative to the platform. At distances greater than 2000 mm from the platform edge, the clear headroom to suspended equipment and signs may be reduced to 2300 mm.

(h) Television monitors or mirrors provided at the end of the platform to assist the train crew should be at least 450 mm clear of the swept envelope, and at a sufficient height, or otherwise positioned so as not to restrict the movement of people. Television monitors or mirrors provided at intermediate locations along the platform should conform with the height and width given above.

(i) Platforms should have a clearance of at least 50 mm to the swept envelope (see Part 2, Section A *The infrastructure*). The platform level should be determined taking into account all rolling stock using the platform.

(j) The floor or footboards of passenger rolling stock should be as close as practicable to the platform. The distances between the platform edge and the floor or footboards of the passenger rolling stock should not exceed any of the following dimensions:

250 mm vertically;

275 mm horizontally; and

350 mm on the diagonal.

These dimensions may only be exceeded when dispensation has been obtained from the Inspectorate. Warning notices reading ‘MIND THE GAP’ with hatching along the platform edge, or other agreed measures, may be required.

(k) A 300 mm wide recess should be formed beneath the platform coping and should be kept clear of cables and other obstructions to provide an emergency refuge. A wider recess may be necessary where there is a platform or other obstruction on both sides of a track.

(l) All platforms should slope away from the adjacent track, have an anti-slip surface and be terminated with ramps at a gradient not steeper than 1 in 8. Platform ramps should be not less

than 2000 mm wide. Island platforms should slope towards the centre and away from both adjacent tracks.

(m) Platform edges should be clearly defined with a strip of a lighter colour. An additional line at least 1000 mm from the platform edge should be provided where trains pass through the station at speeds greater than 165 km/h and explanatory signs should be displayed. A tactile surface should indicate the edge to visually impaired people.

Note: Where freight trains pass through stations at speeds less than 165 km/h the additional line and explanatory signs may be required.

Platform lighting

25 Platform lighting should be provided in accordance with Chapter 3.

Barrow crossings

26 Barrow crossings should only be considered for lightly used stations where the line speed does not exceed 165 km/h and no alternative arrangements are reasonably practicable. An indication that it is safe to cross should be provided when the visibility gives less than 30 seconds warning of an approaching train. A white light extinguished for 40 seconds before the arrival of a train with a notice reading 'Caution - Cross only when light shows' is the preferred arrangement for staff or when passengers are escorted by staff. Where there is unescorted passenger or public use, miniature red/green lights should be provided. An audible warning should be provided if such a crossing may be used by unaccompanied visually impaired people.

Protective fencing

27 The back edge of platforms not otherwise protected should be fenced to a height of at least 1500 mm.

28 Protection should be provided at parts of the end of a platform from which there is no ramp.

3 OTHER PUBLIC AREAS

29 This chapter provides general guidance for the design of all stations. Additional guidance for sub-surface (including underground) stations is set out in Chapter 9.

Note: The guidance given in Chapter 9 may also apply to new major surface stations and to existing surface stations where they are altered by building over or otherwise covering over a significant part of the station.

30 Factors to consider about the layout of other public areas:

(a) The public areas of stations should allow the free movement of passengers. These areas, which include passageways and stairways etc, should be designed, subject to the minimum dimensions given in this guidance, for the foreseeable peak passenger usage, with due allowance for operational difficulties in emergency conditions.

(b) Allowance should be made for the surge of passengers arriving by trains, for the presence and movement of passengers carrying luggage, those accompanied by children and for the mobility impaired.

(c) Changes in the width or direction of passageways which could cause constriction of passenger flow routes or congestion should be avoided.

(d) Vehicles and plant should be segregated from the passenger areas so far as is reasonably practicable.

(e) Stations should be durable and easy to inspect, maintain and clean. Where it is intended to clean any part of a station while the station is in use, then adequate provision should be made to ensure that this does not disrupt the functioning of the station.

(f) All floors, steps, treads etc should be designed taking into account environmental conditions, contamination and cleaning to minimise the risks of slipping and tripping.

(g) All areas open to the outside environment should have adequate means for draining water and prevention of ponding.

(h) The headroom in all passenger areas of stations should be not less than 2500 mm. Equipment or signs should not reduce headroom below 2300 mm.

(i) Any obstructions in public areas such as columns, posts, seats etc should be clearly visible and minimise the risks to the visually impaired.

(j) Where disabled passengers have access to stations, provision should comply with any relevant legislation for the disabled.

(k) The way passengers will be dispersed outside the station should be considered, as well as assembly points for evacuated staff.

Station forecourts

31 Station forecourts and approaches should provide:

(a) safe access to the station for people;

(b) safe access to the station for intended road vehicles including the emergency services;

(c) safe boarding and alighting from road vehicles; and

(d) segregation of road traffic, pedestrians and trains.

Rendezvous points

32 A rendezvous point for the emergency services should be identified in a place of safety which should be readily accessible to their vehicles. It should be conspicuously marked, have means of communication with the station control room, and plans of the station should be provided for the emergency services.

Entrances, exits and doors

33 Factors to consider about entrances, exits and doors:

(a) All entry and exit routes should be clearly signed. Normal entrances may be suitably signed and designated as emergency exits. The exits should be designed to ensure the integrity of the means of escape to allow the station to be evacuated safely.

(b) Escape routes should discharge to a place of safety capable of being used at the material time and, where reasonably practicable, outside the station premises. Where appropriate, exit routes should be protected from the effects of fire and smoke.

(c) Doors should be avoided in all main circulation areas and passenger flow routes. Doors may be used to control passenger flow and environmental conditions in other areas such as passenger waiting rooms, catering and shopping areas. Doors should not be provided adjacent to escalators, passenger conveyors and exits from lifts.

(d) Where doors are provided, due consideration should be given to:

(i) the free flow of passengers normally and in emergency;

(ii) bi-directional flow; and

(iii) the failure modes of power-operated doors.

(e) Glass screens and doors should be suitably marked to ensure visibility to all users including the visually impaired. Where trolleys or mechanical plant are to be used, suitable barriers should be provided to protect glass screens.

Station lighting

34 Factors to consider about station lighting:

(a) All station premises to which people have access during the hours of darkness should be adequately lit. Areas to which passengers have access, including foot-bridges, subways, passages, stairways, steps, ramps and escalators, should be permanently lit when there is no daylight.

(b) Lighting levels should be graduated as required for comfort, safety and monitoring. Abrupt changes in illumination level should be avoided. The level of illumination should enable the train crew to have a uniform view of platforms both on approach, and through monitors and mirrors where provided.

(c) Emergency lighting should be provided in accordance with current British and European Standards.

(d) The station name should be conspicuously shown at intervals along all platforms and the name boards should be lit when the station is open during the hours of darkness.

Ventilation

35 The means of ventilation should be capable of maintaining a supply of fresh air and an air temperature in the public areas of the station of not more than 25°C or more than 5°C above outside ambient temperature when this exceeds 20°C.

36 Station ventilation should, as appropriate:

(a) have means of maintaining a safe environment and escape routes for a sufficient period of time to enable evacuation of the station;

(b) have means of purging smoke from public and non-public areas once evacuation has been completed;

and be simple to operate from a central service control room and locally at the station.

Note: Where complex ventilation systems are installed, computer-aided decision-making as to the most appropriate mode of operation may be required.

Information displays

37 Passenger information displays should be located so that passengers seeking information do not obstruct the free flow of other passengers.

4 NON-PUBLIC AREAS AND FACILITIES

38 This chapter gives guidance on those areas to which the public do not normally have access.

39 Non-public areas should be segregated from public areas and appropriate arrangements made to prevent unauthorised access.

Station control room

40 All major surface and all sub-surface (including underground) stations should be provided with a control room or point from which the activities of the operation of the station can be co-ordinated.

41 The following facilities should be provided:

(a) an emergency procedure information system;

(b) a means of monitoring fire detection systems including audible and visual alarms and means of co-ordinating and controlling all other fire safety features provided for the station;

(c) a means of summoning the emergency services;

(d) communication between station staff, other parts of the railway system and external agencies, including the emergency services rendezvous point (see Chapter 3);

(e) appropriately zoned public address equipment;

(f) a means of monitoring the operation of, and controlling, any escalators, passenger conveyors, lifts, ticket barriers and other equipment which could influence the free flow of passengers;

(g) a means of selecting and controlling the various ventilation modes; and

(h) closed-circuit television (CCTV) monitoring of all public places in the station, including emergency exit staircases not normally used.

42 The station control room or point should be easily accessible to the emergency services via a protected route from the open air and be located, designed and constructed so that it can continue to function during an emergency. If this cannot be achieved, some duplication of facilities will be required at another point which is easily accessible and is in a safe location.

43 Where operating conditions permit, more than one station may be supervised from one station control room, but sufficient facilities should be provided at all stations to enable an emergency to be effectively managed.

Machine and plant rooms

44 Factors to consider about machine and plant rooms:

(a) Machine rooms, including escalator inclines, should be adequately lit and include emergency lighting.

(b) A means of communication with the control room/control point should be provided.

(c) Appropriate fire detection and suppression systems should be provided in machine rooms and on escalator inclines. All fire detection systems should be linked to the main station fire alarm system.

(d) An effective means of alerting staff inside a machine room to activation of any fire alarm on the station may be necessary.

(e) The appropriate safeguards should be provided to prevent people coming into contact with the dangerous moving parts of machinery in machine rooms.

5 STAIRWAYS, STEPS AND RAMPS

45 This chapter provides general guidance for the design of stairways, steps and ramps including those for foot-bridges and subways.

46 Factors to consider about stairways, steps and ramps:

(a) Stairways, steps and ramps should be of uniform and adequate width to avoid overcrowding, and should not be obstructed by any transverse barrier. The available width should not be reduced in any way by any erection or obstruction. Stairways, steps and ramps should have anti-slip surfaces.

(b) Where a stairway or a ramp leads directly towards a platform edge, a barrier should be provided beyond the run-off landing if the distance to the platform edge is less than 5000 mm.

(c) The steps of all stairways should be of uniform design complying with BS 5395 *Stairs, ladders and walkways*. However, they should have a 'rise' of between 100 mm and 180 mm, with an optimum of 150 mm. The 'going' should be between 280 mm and 350 mm with an optimum of 300 mm. Twice the 'rise' plus the 'going' should be at least 550 mm and should not exceed 700 mm; the optimum is 600 mm. The edge of treads should be conspicuously marked.

(d) Intermediate landings should be provided between flights of steps in stairways. The maximum number of steps in each flight should normally not exceed 16, but in cases of difficulty a single flight of steps with an overall rise of 3000 mm is acceptable. The length of the top, intermediate and bottom landings should be at least equal to the width of the widest section of the staircase between handrails.

(e) Stairways and ramps should be provided with continuous handrails on both sides, fixed at a height of not less than 850 mm, or more than 900 mm, measured vertically above the pitch line. Handrails should present a round surface between 45 mm and 50 mm in diameter for easy use by the disabled. They should extend beyond the last step or the end of a ramp and be suitably terminated, provide clear passage of the hand from end to end and be at least 50 mm clear of any obstruction.

(f) Stairways and ramps should be at least 1200 mm wide between handrails to accommodate passengers with luggage. Wider stairways and ramps should have intermediate handrails so that the distance between handrails is not less than 1200 mm or more than 2400 mm.

(g) Ramps for passenger access should be constructed at a gradient not steeper than 1 in 20. In case of difficulty however, and where ramps are not to be regularly used by disabled people, they may be at a slope of 1 in 12. Ramps should be provided with landings at intervals of not more than 10 m and of a length not less than the width of the ramp.

(h) A change in direction or an offset should be provided at every second landing for ramps with a gradient not steeper than 1 in 20 and at every landing for steeper ramps.

6 ESCALATORS, PASSENGER CONVEYORS AND LIFTS

47 This chapter provides general guidance for the design of escalators, passenger conveyors and lifts at stations.

48 Lifts, escalators, and passenger conveyors should be installed so that the ambient environmental conditions of their machinery and controls are maintained within the working limits specified by the manufacturer. If not within a building they should be protected against the effects of the weather. Measures may also be necessary to protect them from materials, such as salt and sand, used in icy conditions.

Alighting areas and passenger flows

49 Factors to consider about alighting areas and passenger flows:

(a) The positioning of escalators, passenger conveyors and lifts should be integrated with passenger flows throughout the station.

(b) The layout of escalators and passenger conveyors should be designed to avoid passengers being transported into an area already blocked by other passengers. Particular care may be required where failure of ticket barriers may cause congestion, or where failure of an onward escalator may cause congestion of an intermediate landing. Sufficient waiting areas should be provided at lifts to avoid obstruction of other passenger flows. There should be no change of direction of any passageway within 2000 mm of lift doors.

(c) Escalator landings with multiple exits should be big enough to accommodate hesitant passengers seeking direction signs before proceeding.

(d) Normally, escalator and conveyor landings and lift doors should not face a platform edge. Where escalators, conveyors or lifts discharge directly towards a platform edge closer than 5000 mm, barriers should be provided.

(e) No escalator, conveyor or lift should provide the sole means of access to or egress from any part of a station.

Escalators and passenger conveyors

50 Status information for lifts, escalators and passenger conveyors should be displayed in the appropriate station control room/control point. For escalators and passenger conveyors this should comprise indications of the direction of running, whether it is stopped and if an emergency stop device has been operated. For lifts, an indication should be given of the operation of the passenger alarm button.

51 All escalators, and passenger conveyors should comply with HSE Guidance Note PM 34 *Safety in the use of escalators* (available from HSE Books ISBN 0 11 883572 6).

52 All escalators and passenger conveyors should comply with EN 115 *Safety rules for the construction and installation of escalators and passenger conveyors*. The special requirements specified for Public Service application apply to all escalators and passenger conveyors which form part of the passenger flow routes. In addition, the following specific options and interpretation of EN 115 apply:

(a) the angle of inclination should not exceed 30° for escalators, and not normally exceed 5° for conveyors;

(b) the minimum width of treadway for escalators and passenger conveyors should be not less than 1000 mm. The minimum width should be at least 1400 mm for passenger conveyors where passenger trolleys are permitted;

(c) where an escalator is installed in a shaft with a curved roof, the overhead clearance at the centre of the nose of the steps should be at least 2300 mm, but where necessary, a clearance over the ends of the steps of 2200 mm may be permitted. On reconstructed escalators some reduction of these clearances may be permitted with the agreement of the Inspectorate;

(d) the horizontal distance between the outer edges of the handrail and the adjacent wall should be not less than 150 mm. This clearance should be maintained up to a height of at least 1700 mm above step level. The emergency stop buttons may be situated within this width, but not within 80 mm of the handrail; and

(e) all escalators, regardless of the rise, should be equipped with an auxiliary brake.

Escalator and passenger conveyor emergency facilities

53 Factors to consider about escalator and passenger conveyor emergency facilities:

(a) The emergency stop devices, provided in accordance with EN 115, should stop only the escalator or conveyor to which they refer unless a second escalator or conveyor is directly cascading passengers toward the stopped escalator or conveyor. In this case the second escalator or conveyor should also stop. It should be clear to which escalator or conveyor each stop device refers.

(b) All equipment necessary to release trapped people or animals should be provided near to each escalator or passenger conveyor, or group of escalators or passenger conveyors, and should be easily accessible to station staff.

(c) Effective barriers should be provided to deter public access to escalators or conveyors when necessary. Where any escalator or conveyor is used as a means of escape in an emergency, the barrier should be provided with an emergency push through facility. Whenever an escalator is made unfit for use as a stairway, barriers to deny access should be provided.

(d) Any unplanned stoppage of an escalator or passenger conveyor should give an audible alarm.

Escalator and passenger conveyor fire precautions

54 Escalators and passenger conveyors should be fitted with effective fire detection and suppression equipment. The equipment should be in accordance with the relevant British and European Standards.

Escalator and passenger conveyor cleaning and maintenance

55 Access should be provided to the underside of escalators to facilitate maintenance inspection and cleaning while allowing the stationary escalator to be used as fixed stairs. Access to inspection chambers or equipment rooms should not block the end of the escalator or obstruct parallel escalators or stairs which remain in use.

56 Where alternative routes exist and provide sufficient capacity for passenger flows or there is time for maintenance to be undertaken when the station is closed, different arrangements may be acceptable.

Lifts

57 All passenger lifts should comply with the relevant parts of EN 81 *Safety rules for the construction and installation of lifts and service lifts*. Where lifts are required for evacuation in case of fire or to provide access for emergency services they should comply with the specific parts of EN 81 and BS 5588 *Fire precautions in the design, construction and use of buildings*.

Lift emergency facilities

58 All passenger lifts should comply with BS 7255 *Code of practice for safe working on lifts* and allow for the emergency release of lift passengers. The following specific interpretation of the emergency release requirements of BS 7255 should be adopted:

(a) each lift car should be provided with an alarm button at low level and a means of two-way speech communication, both connected to a location which is continuously manned at all times when passengers may be using the lift. These devices should be powered from a supply that is independent of the main lift supply. Where the lift is provided with dual supplies, this may provide an acceptable alternative;

(b) emergency lighting with a duration of a least 3 hours should be provided in all lift cars and connecting corridors, subways, and bridges. This should be illuminated automatically on failure of the main supply; and

(c) two-way speech communication should be provided between the lift car and the location from which the emergency release is controlled.

59 Any unplanned stoppage of a lift should give an audible alarm.

7 TERMINAL TRACKS AT STATIONS

60 This chapter provides additional guidance where tracks terminate at a station.

61 Factors to consider about terminal tracks at stations:

(a) Normally, energy absorbing buffer stops should be provided at terminal stations or bay platforms. The buffer stop should be designed to stop the heaviest train from its determined impact speed without the risk of serious injury to people on the train while avoiding excessive deceleration of other lighter trains.

(b) Premises, including kiosks and ticket collectors' booths which are normally occupied by staff or the public, should not be positioned within 20 m from the face of buffer stops nor within a line 2000 mm back from the platform edge.

Note: This provision may be relaxed if the train control and signalling system is designed to guard against buffer impact.

(c) Where a sub-surface railway terminates at a station, an adequate length of overrun tunnel should be provided.

(d) Buffer stops should be compatible with the train design and should be designed to bring a train to a halt in a controlled manner with a retardation rate not exceeding 15% g (1.47 m/sec^2). The impact speed should be determined based on a consideration of track layout, approach speed, any automatic train protection, visibility and foreseeable misjudgement.

(e) A pair of fixed red lights or reflective markers should be provided at fixed buffer stops except where white lights are needed to suit the requirements of signalling.

8 STATION FIRE PREVENTION

62 This chapter provides general guidance for the prevention of fire within a station.

63 Factors to consider about station fire prevention:

(a) The public areas of the station and the choice of materials in public areas should be such as to keep the fire load and the smoke and toxic gas generation in the event of a fire to a reasonably practicable minimum.

(b) Public areas should be segregated from non-public areas.

Note 1: The arrangements for means of escape from fire at all surface stations should be in accordance with Home Office guidance in respect of the Fire Precautions Act 1971 for certifiable and non-certifiable premises in so far as it is applicable to stations.

Note 2: The sub-division of the public area by such devices as 'smoke-doors', whether normally open or closed, is not considered an appropriate method for the control of smoke during the period of passenger evacuation but may be appropriate to help in protection of escape routes. Smoke doors should not reduce exit widths or otherwise impede means of escape during evacuation. Means may be required to delay the closing of such doors while evacuation is in progress.

(c) An electrical fire alarm should be provided which is capable of manual operation by the public or staff, and installed in accordance with the relevant British and European Standards. The public areas of the station should be provided with an effective system of surveillance and public address. Public address systems should be protected in the manner outlined in BS 5839 *Fire detection and alarm systems for buildings*.

Note: Minor surface stations may be exempt from this provision under section 9 of the Fire Precautions Act 1971.

(d) The non-public areas of stations may require a warning or address system. An effective means may be necessary to alert staff inside plant and machine rooms to the activation of any station fire alarm.

(e) Radio/telephone networks should be provided allowing communication between any station control point and other staff on the station. The network should be compatible with emergency services communications equipment.

(f) Retail outlets, if provided, should be in accordance with Chapter 9.

Fire in the station structure

64 The following conditions should be used for the design of escape capacity from a fire in the station structure:

(a) Occupancy at the time of evacuation should be based on peak usage with 5 minutes delay to the planned train service in the busiest direction only.

(b) The exit route with the greatest capacity should be discounted, as it could be blocked by fire.

(c) Passengers waiting to board, plus those normally alighting from the next train in each direction should be evacuated.

(d) Passengers should be able to clear each platform through the remaining exits and reach a protected route to safety within a specified time, acceptable to the Inspectorate and the Fire Authority, after receiving the instruction to evacuate.

Fire on a train at a platform

65 The following conditions should be used for the design of escape capacity from the station platform in the event of an emergency:

(a) Occupancy at the time of evacuation should be based on peak usage with 5 minutes delay to the scheduled train service in the busiest direction only.

(b) Passengers to be evacuated are all the occupants as defined in (a), plus all the occupants of a crush-loaded train (assumed on fire), plus those normally expected to alight from the next train in the other direction or on any other lines.

(c) All exit routes may be counted as available for use but any escalators should be regarded as continuing to run in the same direction as before the emergency.

(d) The passenger escape arrangements should assume passengers cannot pass along the platform or through the train past the source of the fire.

(e) The passengers identified in (a) should be able to reach a protected route to safety within a specified time, acceptable to the Inspectorate and the Fire Authority, from receiving the instruction to evacuate.

Note 1: The size of escape routes to meet the objectives should be based on appropriate data on flow rates, the source of which should be documented.

Note 2: A train is the most likely source of fire requiring evacuation of the greatest number of people through the station. If the fire is elsewhere, it is assumed the train will evacuate those on board.

Note 3: Normally, for example, for a sub-surface station, the passengers should be able to clear each platform within 4 minutes, and reach a protected route to safety within 6 minutes.

Additional fire prevention and environmental control facilities for underground stations

66 Station compartmentation, fire detection and fire suppression must be in accordance with the Fire Precautions (Sub-Surface Railway Stations) Regulations 1989. Smoke from any such fire should be contained or controlled, by ventilation or other suitable means, at least for the duration of any evacuation.

Note 1: The arrangements for means of escape from fire at all sub-surface stations should be in accordance with Home Office guidance in respect of the Fire Precautions Act 1971 for certifiable and non-certifiable premises in so far as it is applicable to stations.

Note 2: The sub-division of the public area by such devices as 'smoke-doors', whether normally open or closed, is not considered an appropriate method for the control of smoke during the period of passenger evacuation but may be appropriate to help in protection of escape routes. Smoke doors should not reduce exit widths or otherwise impede means of escape during evacuation. Means may be required to delay the closing of such doors while evacuation is in progress.

Additional fire-fighting provisions for underground stations

67 Fire precautions and fire-fighting provisions should be not less than those required in the Fire Precautions (Sub-Surface Railway Stations) Regulations 1989, with the following additions:

(a) a fire-fighting shaft and, where disabled passengers have access to the station, means of escape for the disabled should be provided to all levels of the station in accordance with BS 5588. Such a shaft may also be counted as part of the means of escape for passengers;

(b) a falling fire main in accordance with BS 5306 *Fire extinguishing installations and equipment on premises*;

(c) where a train fire could create a high fire loading, a suitable system to minimise the intensity and rate of propagation of a train fire, such as a water drenching system installed above the location of a train at each platform, should be installed based on analysis of risk.

Note: Where a water drenching system is installed above the location of trains in platforms, the discharge heads should be operable only on command from the station control room or at platform level. Discharge may be zoned so only the appropriate heads are opened.

9 ADDITIONAL GUIDANCE FOR SUB-SURFACE (INCLUDING UNDERGROUND) RAILWAY STATIONS

68 This chapter provides additional guidance for sub-surface (including underground) railway stations.

Note: This guidance may also apply to new major surface stations and to existing surface stations where they are altered by building over or otherwise covering over a significant part of the station or platform(s).

Additional general guidance

69 The public areas of the station should be designed for the free movement of passengers. The widths of platforms, passageways, stairways, escalators and passenger conveyors should be designed, subject to the minimum widths given in previous chapters for the foreseeable peak passenger usage, with due allowance to prevent congestion being caused by extended intervals between trains.

70 Additional factors to consider about sub-surface station design:

(a) Any congestion control measures which will apply in the event of a severe disruption of service.

(b) If the railway undertaking intends to carry passengers with disabilities, including those in wheelchairs, appropriate provisions such as lifts to all public levels should be incorporated.

(c) The arrangements for evacuation in an emergency.

(d) Access to platforms should be in accordance with guidance for platforms.

71 The flows of arriving and departing passengers should be separated so far as is reasonably practicable. Passengers moving from one part of the station to another should not be routed along any platforms. Means to warn passengers and deter them from entering either in an emergency or to prevent congestion should be provided at all entrances and exits to the station.

72 All rooms, platforms, escalators, lifts, staircases etc should have conspicuous and unique identification signs. All passenger routes to and from platforms should be clearly signed.

73 Retail outlets should not be located lower than the first ticket hall/concourse level accessible to the public, and should not be sited so as to cause congestion or obstruction of the passenger flows. They should have a fire detection system and fire-fighting equipment automatically operated by outbreak of fire in that part of the premises.

Additional guidance for platforms

74 Factors to consider about platforms:

(a) Subject to the minimum dimensions below, platforms should accommodate the passengers waiting to board a train after a minimum of 5 minutes delay to the planned train service in the peak period.

(b) Any single-face platform should be not less than 3000 mm wide and any island platform not less than 6000 mm wide. Exceptionally a minimum width from any obstruction of 2000 mm may be permitted near to the extreme ends of the platforms.

(c) The main structure of the station should provide a headroom of at least 3000 mm over the whole length and width of platforms.

(d) Separate entrances and exits should be provided and arranged to facilitate even loading of the platforms and rapid egress with minimum congestion or confliction. Normal entrances may be signed as emergency exits where appropriate, and counted as such in evacuation calculations. Additional widths of platforms may be required adjacent to entrances to and exits from the platform to avoid congestion at these places.

(e) At least two alternative escape routes should be provided from each platform, with a travel distance of not more than 90 m between any two exits.

(f) The length of any platform should be adequate for the longest train used on the line and include an allowance for the accuracy with which trains can be stopped at the platform. An additional length beyond the stopping tolerance should be provided at both ends of platform to allow access to and from the track while a train is stopped at the platform.

(g) A track adjacent to a platform accessible from the platform side only should have an emergency pit accessible from either end when a train is in the platform unless platform edge screen doors are provided, or where there is a clearance of at least 450 mm between the track bed and all under-train equipment over a width of 600 mm.

(h) Platforms should be straight or, if unavoidable, curved at a radius not less than 1000 m.

(i) Platform edge screens and doors should only be installed at stations on lines with automatic train operation and should be fully compatible with the rolling stock.

(j) Platform screen doors should be designed to withstand crowd crush loading and should be of sufficient height to deter climbing. All platform edge screens should include means of access and egress from the track and adjacent tunnels.

Lighting

75 The station should be permanently illuminated in accordance with Chapter 3 when occupied and be provided with an adequate illumination system for evacuation with two independent power supplies.

76 For sub-surface stations emergency lighting must be in accordance with the Fire Precautions (Sub-Surface Railway Stations) Regulations 1989.

Ventilation

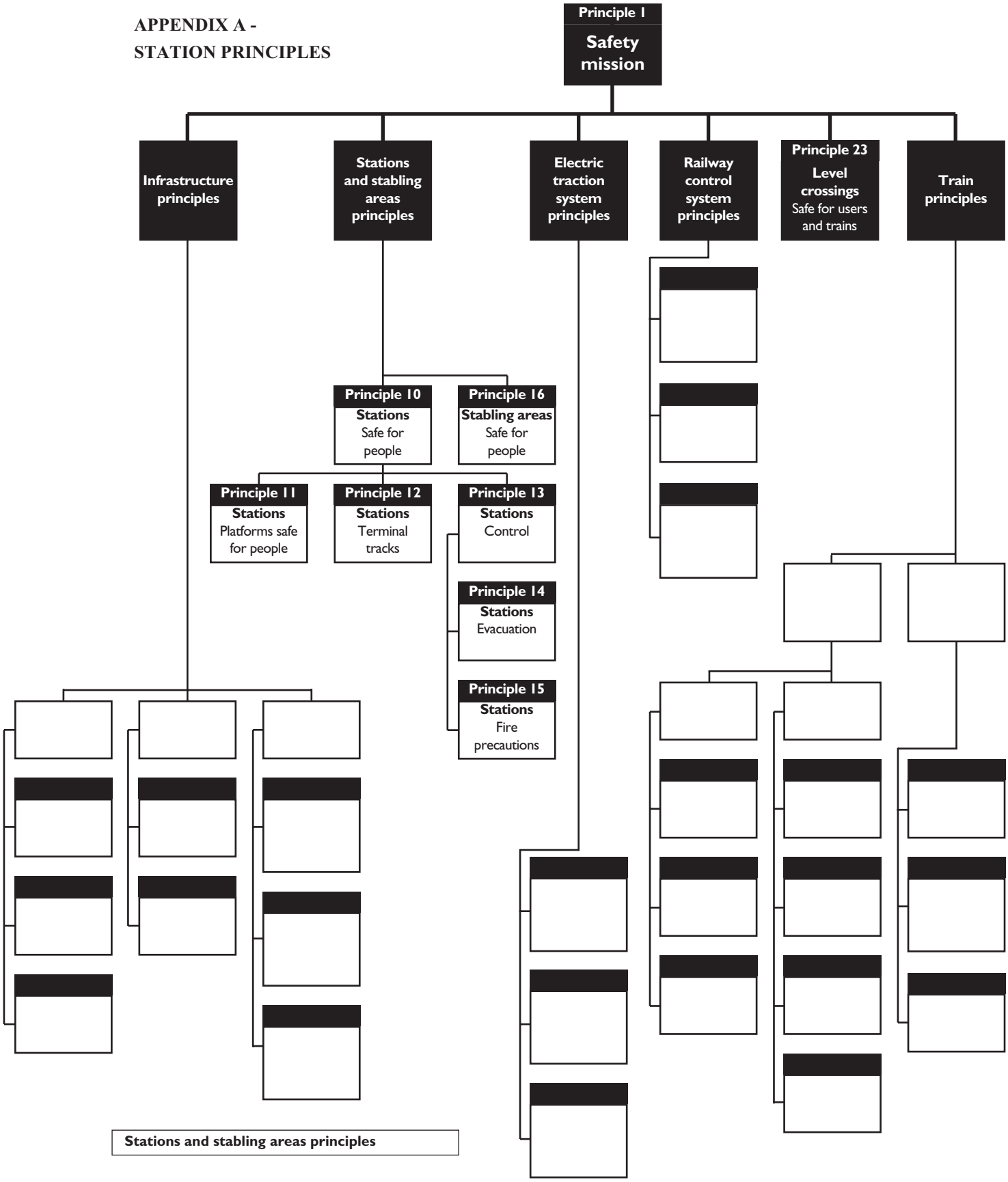
77 Station ventilation systems should include the following as appropriate:

(a) a means to control smoke from retail premises;

(b) a means to accommodate the aerodynamic effects generated by trains passing through restricted spaces; and

(c) a smoke extraction system along the length of the platform railway tracks, designed to prevent smoke from a train fire spreading to the other parts of the station.

APPENDIX A - STATION PRINCIPLES



PRINCIPLE 10
Stations

Safe for people

Stations should provide for the free and safe movement of people.

Factors

The factors for consideration should include:

(a) the movement of people and their waiting within a station in normal or abnormal operating conditions;

(b) the provisions to control overcrowding;

(c) the behaviour of people in enclosed areas;

(d) the sizing and treatment of surfaces of concourses, passageways, ramps, stairs, escalators and platforms;

(e) the suitability of escalators, lifts and passenger conveyors for the number of people they are to carry;

(f) the number, size and spacing of exits;

(g) the positioning of booking offices and other retail outlets;

(h) the provision of communication equipment and signs;

(i) the provision of lighting;

(j) the provision of emergency lighting in the event of loss of power supplies;

(k) ventilation arrangements;

(l) the integrity of the station structure and its ability to survive emergency situations;

(m) the security of people; and

(n) the special arrangements necessary for sub-surface stations including the additional risks caused by fire and the need to segregate evacuation routes and provide ventilation control systems.

Platforms safe for people

Platforms should allow for the safe waiting of people, their boarding and alighting from trains.

Note: In the case of tramways, the station may form part of and be influenced by the surrounding roads, pavements and other public areas.

Factors

The factors for consideration should include:

(a) the protection arrangements for structural supports against derailment;

(b) the compatibility with the trains;

(c) the surface alignment in relation to the level of the track and the floor height of the trains;

(d) the arrangements to control access to the platforms;

(e) the facilities for train crew to observe boarding and alighting passengers;

(f) provision for people waiting on the platform and the movement of people on and between platforms;

(g) the need to avoid 'pinch points' at platform entrances and exits;

(h) the effect of platform edge screen doors on the station and other systems of the railway;

(i) the positioning of vending facilities;

(j) the arrangements to deter trespass from the platform onto unauthorised parts of the railway;

(k) the surface treatment and drainage of platforms to avoid tripping and slipping;

(l) the need for platforms to be easily cleaned and the avoidance of places where debris can collect;

(m) the aerodynamic effects generated by trains passing through restricted spaces; and

(n) ventilation arrangements.

PRINCIPLE 11

Stations

PRINCIPLE 12
Stations

Terminal tracks

Where stations have terminal tracks, arrangements should be provided to arrest a train and protect people and the station from the effects of an overrun.

Factors

The factors for consideration should include:

(a) the positioning of structural and other critical supports;

(b) the positioning of booking offices and retail outlets;

(c) the areas where people are likely to congregate;

(d) the overrun provisions and type of arresting device(s) provided;

(e) the protection that can be gained from automatic train protection or train stop systems;

(f) the effect on braking performance of the elements and the covering or otherwise of the track; and

(g) the balance of risk between damaging the train and injury to its passengers, and damaging the station and the people using the station.

PRINCIPLE 13
Stations

Control

Facilities should be provided for the operational control of the station in co-ordination with the railway and with activities adjacent to the railway.

Factors

The factors for consideration should include:

(a) the means of co-ordinating activities on the railway with those within the station so they do not cause additional risks to each other;

(b) relationships and liaison arrangements with adjacent or connecting railway systems and with activities adjacent to the railway;

(c) the level and diversity of surveillance, communication and information required to control the activities within the station complex;

(d) the means of communication and the provision of information and instructions to workers and other people;

(e) the liaison arrangements at the station for the emergency services; and

(f) the availability of control facilities during emergency situations.

Evacuation

PRINCIPLE 14

Stations

The station and its control arrangements should allow for safe evacuation in an emergency.

Factors

The factors for consideration should include:

(a) the time taken to complete evacuation of the station;

(b) the protection of evacuation routes;

(c) access for emergency services, especially in sub-surface stations;

(d) information systems for evacuation of the station;

(e) the zoning of public address systems; and

(f) the management of any ventilation system.

Fire precautions

PRINCIPLE 15

Stations

Stations should have fire and fume prevention and control measures commensurate with the fire risk and evacuation arrangements.

Note: This principle is not applicable to tramstops which are not enclosed.

Factors

The factors for consideration should include:

(a) minimising the fire load;

(b) the segregation of public areas of stations from non-public areas and high fire risk areas;

(c) the provision of fire detection and warning systems and fire suppression systems;

(d) ventilation and zoning for fume extraction systems to limit smoke from a fire spreading to other parts of the station;

(e) the aerodynamic effects generated by trains passing through restricted spaces;

(f) the provision and identification of initial fire-fighting equipment;

(g) facilities and systems for fire-fighters;

(h) the location of a suitable 'rendezvous' point where station staff will meet emergency services; and

(i) the additional risks caused by fire in a sub-surface station and the need to segregate evacuation routes and provide ventilation control systems.

PRINCIPLE 16
Stabling areas

Safe for people

The railway should provide for the safe stabling, marshalling and maintenance of trains.

Factors

The factors for consideration should include:

(a) the segregation of the stabling, marshalling and maintenance areas from the running lines;

(b) the protection of people in these areas from danger from moving trains;

(c) the position of any electric traction system, its sectioning and its means of isolation to facilitate train maintenance;

(d) protection of the area from activities adjacent to the railway;

(e) the need for adequate clearances and walkways;

(f) the need for identifiable crossing places;

(g) secure stabling of trains;

(h) segregation of road vehicles in the area from trains and people;

(i) the arrangements for the control of train movements within, into and from the area; and

(j) the provision of lighting for operational activities.

APPENDIX B - COMMON TERMS

Where possible the document has been written in plain English and the use of technical expressions or jargon has been avoided. However, to keep the document reasonably concise and to avoid the repetition of phrases which only serve to provide an extended definition, some words or expressions are used in a way which has a slightly wider meaning than their natural meaning, or a meaning that is different to that accepted by disparate parts of the Railway Industry.

The following are terms used within the document:

Railway terms

'Railway' means all guided transport systems to which the Railway and Other Transport Systems (Approval of Works, Plant and Equipment) Regulations 1994 apply. It includes main-line (heavy) railways, mass transit, light rail, tramway and heritage systems.

'Tramway' means a system of transport used wholly or mainly for the carriage of passengers which:

(a) employs parallel rails which provide support and guidance for vehicles carried on flanged wheels; and

(b) has been designed to have a significant element which operates on line-of-sight on a highway.

Note: In the context of tramways, 'highway' is used to mean any, or any combination of the following: carriageway, bridleway, cycle track, footpath, land on the verge of the carriageway or between two carriageways and any other place to which the public has access (including access only on making a payment).

'Heritage system' means a railway or tramway which has retained or has assumed the character and appearance and, where appropriate, operating practices of railways or tramways of former times. For example, it may replicate a railway branch line of former times, or may reflect no particular era but demonstrates a wide variety of motive power and rolling stock at work, irrespective of company (or country) of origin.

'Other guided transport system' means a system, other than a railway or tramway, where the vehicles operating on it are guided by means external to the vehicles (whether or not the vehicles are also capable of being operated in some other way). The term therefore includes monorails and airport transit systems.

Note: Trolleybuses are excluded because they are not in any circumstances guided externally, and funiculars are not included because they fall under the definitions of railway or tramway.

People terms

'People' means workers on the railway, passengers, emergency services personnel, people on

business, level crossing users and trespassers (those who are on railway property when they have no right to be there) on the railway.

There are four types of **'people':**

(a) **'Workers'** means staff and contractors directly employed on the railway (including the train crew, station staff, signalling staff etc) and contractors employed in the supply industries, maintenance facilities and disposal organisations. The workers may be employed at a fixed location or move about the railway.

(b) **'Passenger'** means any person who is on railway property and is travelling, or intends to travel, or has recently completed travelling on the railway. Consideration should be given to a wide range of passenger characteristics and classifications, for example:

- passengers who are disabled (visually, hearing or mobility impaired);
- children and unusually short and tall adults;
- passengers with heavy luggage, pushchairs, young children etc.

Passengers may be on the station premises (waiting to purchase a ticket, waiting on the platform etc) or on a train.

(c) **'People on business'** means people who:

- visit railway premises as non-travelling 'passengers' (people meeting or seeing off passengers, train spotters, customers of station retail units etc);
- are official visitors to the railway.

(d) **'Level crossing users'** means people crossing the railway on or at a level crossing. This includes pedestrians, horse-riders and occupants of road and agricultural vehicles.

Infrastructure terms

'Infrastructure' means works, plant and equipment used for the operation of a railway including its permanent way, and plant and equipment used for signalling or exclusively for supplying electricity for operational purposes to the railway, but it does not include a station. It refers to track, structures supporting it, signalling, and fixed electrical plant such as feeders, switchgear, sub-stations and the like.

Station terms

'Station' means a railway passenger station or terminal, but does not include any permanent way or plant used for signalling or exclusively for supplying electricity for operational purposes to the

railway. For tramways, 'station' is used to include a tramstop or platform. A station includes a halt, terminal station and a station complex with or without retail units. 'Station' does not include areas associated with station premises, such as car parks, which lie outside those premises.

'Sub-surface station' means a station of which more than half of any one platform is within a tunnel or under a building.

Train terms

'Train' means any vehicle or combination of vehicles which run on the railway. Therefore, a train may consist of a single vehicle or a number of vehicles coupled together including any locomotives or power units. A train may be composed of one or more vehicles and vehicle inter-connections. These can be passenger and freight, also maintenance and construction, vehicles. It also includes on-track machines, engineers' trolleys, cranes and other plant while operating on a railway (commonly referred to as on-track plant or machines). For tramways 'train' means a tramcar or two or more tramcars coupled together and includes non-passenger vehicles.

Electric traction system terms

'Electric traction system' means the electrical equipment and conductors necessary to power trains on the railway. It includes the switchgear and transformers which control the electric current at line voltage, the distribution network and overhead line or conductor rail equipment. It does not include the collection equipment of the train or other on-board equipment.

Safety terms

'Foreseeable' means that which is likely or possible.

'Hazard' means a situation with the potential to cause harm including human injury, damage to property, plant or equipment, damage to the environment, or economic loss.

'Risk' means the chance of something adverse happening and its severity. It is the combination of the probability, or frequency, of the occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

'Safety' means the freedom from unacceptable risks of personal harm, ie the avoidance of accidents and incidents.

Operational conditions or states

'Normal conditions' means the conditions which a part of the railway is designed to accommodate. This would include the peaks, eg rush hours, and troughs in demand experienced during the day.

'Degraded conditions' means the state of the part of the railway system when it continues to operate in a restricted manner due to the failure of one or more components.

'Abnormal conditions' means extreme loading on a part of the railway system. For example, this may be the result of extended delays on one part of the service impinging on another.

'Emergency situation' means a current unforeseen or unplanned event which has life threatening or extreme loss implications and requires immediate attention, eg a fire.

FURTHER INFORMATION

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops and free leaflets can be downloaded from HSE's website: www.hse.gov.uk.)

For information about health and safety ring HSE's Infoline Tel: 08701 545500 Fax: 02920 859260 e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

British Standards are available from BSI Customer Services, 389 Chiswick High Road, London W4 4AL Tel: 020 8996 9001 Fax: 020 8996 7001 Website: www.bsi-global.com

The Stationery Office publications are available from: The Stationery Office, PO Box 29, Norwich NR3 1GN Tel: 0870 600 5522 Fax: 0870 600 5533 e-mail: customer.services@tso.co.uk Website: www.tso.co.uk (They are also available from bookshops.)

This document contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

01/05 Published by the Health and Safety Executive